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# PATENT SPECIFICATION



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## PROVISIONAL SPECIFICATION

### Improvements in and relating to the Manufacture of Articles of Glass in combination with Plastic Materials

We, **PILKINGTON BROTHERS LIMITED**, of 703, Tower Building, Water Street, Liverpool, in the County of Lancaster, a British Company, and **LEWIS JEX-BLAKE FORBES**, of "The Crossways", View Road, Rainhill, St. Helens, in the County of Lancaster, England, a British Subject, do hereby declare the nature of this invention to be as follows:—

10 This invention has for its object the manufacture of articles composed of glass in combination with plastic materials requiring heat and/or pressure for moulding.

15 It has heretofore been found impracticable to manufacture commercially articles composed of glass in combination with plastic materials of the kind described, especially when the pressure required for moulding the plastic material has to be applied in such a way that the glass is subjected to shearing or bending stress due to this pressure or any substantial component thereof.

25 For instance, if the article to be made is a tray composed of a sheet of glass embedded in a rim of plastic material such as that known under the registered trade mark "Bakelite", the edge of the glass entering the mould for the rim is subjected to the heat which has to be supplied to the "Bakelite" powder and to a component of the pressure which has to be applied to mould it, and it has been found

35 that the glass is broken in the moulding process.

According to the invention, the glass is tempered and the mould is so designed that the flow of plastic material is rendered as free as practicable round the edge of the glass.

40 By way of example, if a tray of the

kind mentioned is to be made, the mould has one portion designed to form, say, the lower portion of the rim below the glass and the outer edge of the rim, and the glass rests on this portion, protruding into the mould a distance sufficient to give effective grip between glass and rim. A second portion of the mould rests on the glass, to form the inner edge of the upper portion of the rim, and a third portion, designed to form the upper portion of the rim is pressed on to the powder filling the space below and above the glass in the first and second portions of the mould. A mould of this form is so designed that the space between the edge of the glass and the inner wall of the outer portion of the mould is of such dimensions relative to the space below the portion of the glass protruding into the mould, that the plastic material can flow easily from the space above the glass to the space below it.

Alternatively, the mould for an article of the kind described may be composed of a peripheral portion designed to form the outer edge of the rim, two portions adapted to rest, one on each side of the glass, to form the inner edges of the rim and two plungers to form the upper and lower edges of the rim respectively.

Alternatively, again, the rim may be moulded in two parts, first a lower portion, moulded independently of the glass, on which the glass rests in the final mould. Then the remaining portion of the rim is moulded on to the first portion and on to the glass together.

Dated this 6th day of February, 1935.  
F. A. CLEMO,  
Chartered Patent Agent,  
9, Kingsway, London, W.C.2.

## COMPLETE SPECIFICATION

### Improvements in and relating to the Manufacture of Articles of Glass in combination with Plastic Materials

80 We, **PILKINGTON BROTHERS LIMITED**, of 703, Tower Building, Water Street, Liverpool in the County of Lancaster, a British Company, and **LEWIS JEX-BLAKE FORBES**, of "The Crossways", View Road, Rainhill, St. Helens, in the County 85

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of Lancaster, England, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described 5 and ascertained in and by the following statement:—

This invention has for its object the manufacture of articles composed of glass in combination with plastic materials 10 requiring, generally, both heat and pressure for moulding.

The invention is applicable to plastic materials requiring for moulding either a pressure of 1000 lbs. per square inch or 15 over, with or without heat, or a temperature of 130 degrees Centigrade or over with or without high pressure.

It has heretofore been found impracticable to manufacture commercially 20 articles composed of glass in combination with plastic materials of the kind described, especially when the pressure required for moulding the plastic material has to be applied in such a way that the 25 glass is subjected to shearing or bending stress due to this pressure or any substantial component thereof.

For instance, if the article to be made is a tray composed of a sheet of glass 30 embedded in a rim of plastic material such as that known under the registered trade mark "Bakelite" the edge of the glass entering the mould for the rim is subjected to the heat which has to be supplied to 35 the "Bakelite" powder and to a component of the pressure which has to be applied to mould it, and it has been found that the glass is broken in the moulding process.

According to the invention, the glass sheet or article is tempered and is placed 40 in a mould with its edge protruding into only a portion of a hollow thereof, the plastic material being filled into the hollow 45 and pressed therein.

Preferably the glass is placed in a first part of the mould and a second part of the mould is pressed on to the glass to press 50 the glass on to the first part and plastic material is filled into the hollow of the mould formed by the first and second parts thereof and pressed therein.

Alternatively, the plastic material may be moulded on to the glass by plungers 55 adapted to apply equal pressure to the plastic material above and below the glass.

Alternatively, also, a portion of the rim may be moulded independently of the glass and placed in a mould base and the tempered glass placed on the said portion 60 of the rim; a second portion of the mould is then placed on the glass, adapted to press it on to the said portion of the rim, and adapted to form the inner edge 65 of the rim above the glass, plastic

material is then filled into the space above the glass and the said portion of the rim and it is pressed to mould it on to the glass and the said portion of the rim by a third portion of the mould. 70

In the accompanying drawings:—

Figures 1, 2, 3 and 4 are central vertical sections through four alternative forms of mould;

Figure 5 is a horizontal section on the 75 line A—A of figure 4;

Figure 6 is a part plan view of an alternative form of mould, and

Figure 7 is a vertical section thereof on 80 the line B—B of figure 6.

Referring to figure 1, the sheet of glass 1, after being tempered is laid on the lower mould member 2, with its edges 3 projecting the desired distance into the mould hollow 4. The mould member 5 is 85 then pressed on to the upper surface of the glass sheet and forms at 6 the inner edge of the upper portion of the rim. The hollow is then filled with plastic material and then the mould member 7, shaped at 90 8 to form the upper portion of the rim, is pressed into the lower mould member 2 to mould the rim. In the case of plastic materials requiring heat in moulding, the mould members are heated, and the glass 95 sheet also is preferably heated before being placed in the mould.

Figure 2 shows an alternative method of moulding a rim on to the glass sheet 1. The lower half 9 of the rim is moulded 100 as an independent and preliminary operation, and is placed in the lower mould member 2. The tempered glass sheet is then laid on to the moulded rim 9, and the mould member 5 is then pressed on to 105 the upper surface of the glass sheet. The hollow 10 is then filled with plastic material and the mould member 7, similar to that in the case of figure 1 is pressed into the lower mould member 2 to mould 110 the upper half of the rim on to the lower half 9 and on to the edge of the glass sheet. In this method, the overhanging edge of the glass sheet is supported by the lower half of the rim against the 115 moulding pressure. The lower half of the rim is preferably moulded without being fully cured, when the nature of the plastic material allows this to be done.

Figure 3 shows a method of moulding 120 the whole rim on to the glass sheet, in which the overhanging edge of the sheet is subjected to less downward pressure than in the case of figure 1. The first lower mould member is formed in two 125 parts, the fixed part 2 and a part 11 capable of a small sliding movement therein. The two parts together form the hollow 4 in which the lower half of the rim is moulded. The upward movement of the 130

part 11 is limited by the bolts 12, and it is pressed upwards to this limit by springs 13. In this position the glass sheet is held above its correct position in the hollow 4. The downward movement of the part 11 is limited by the stop bars 14, and in this lower position the glass sheet is held in its correct position in the hollow 4. The mould member 5, slidably carried by the upper mould member 7 is then laid on the glass sheet 1 and the hollow 4 is then filled with plastic material. Springs 15 are placed between the mould members 5 and 7 and, when the member 7 is lowered, it bears on the springs 15 to press the member 5 on to the glass. The springs 13 and 15 are of such relative stiffness that, as the member 7 begins to exert pressure on the plastic material, the springs 15 overcome the springs 13 and so press the member 5 and the part 11, with the glass, downwards, until the part 11 rests on the stop bars 14, when the glass sheet is in its correct position in the mould hollow. By this means, as the pressure due to the descending mould member 7 comes on to the overhanging edge of the sheet, this latter is also moving downwards to compress the plastic material below it, so that the edge is subjected to an upward pressure as well as a downward pressure.

Figures 4 and 5 show a method of moulding a rim on to a glass sheet in which the moulding pressure exerts no bending moment on the overhanging edge of the glass sheet. The lower member 2 of the mould has a support for the tempered glass sheet 1, and, below the overhanging edge 3 of the glass sheet, has a hollow adapted to form the inner edge and side of the lower portion of the rim. It also has corner pieces 16 in which are hollows at 17 adapted to form the circular periphery of the rim. A second mould member 5 is placed on the glass sheet, and a third mould member 18, adapted to slide over the member 5, is laid on the member 2, resting on the corner pieces 16, and bolts 19 fix the member 18 to the member 2. Springs 20 are placed between the members 18 and 5 and serve, when the member 18 is bolted to the member 2, to press the member 5 on to the glass sheet. Plastic material is filled into the hollow 4 formed by the members 2, 5 and 18, and four plungers 21, adapted to slide in the spaces between the members 2 and 18, and between the corner pieces 16, are pressed inward to mould the plastic material on to the edge of the glass sheet.

Figures 6 and 7 show an alternative method of moulding a rim on to a glass sheet, in which the moulding pressure is substantially equal on upper and lower surfaces of the overhanging edge of the glass sheet. The tempered glass sheet 1 is laid on the lower mould member 2, with its edge 3 protruding into a hollow 4 in the member 2, which is adapted to form the inner edge of the lower part of the rim and also, at 33, the circular periphery. The member 2 has a channel 22, in which is adapted to slide a rectangular plunger 23. The plunger 23 is connected by rods 24 to a frame 25 below the member 2, by means of which it can be pressed upwards from the position shown into the position in which its upper surface forms the lower side of the rim. The plunger 23 is maintained in the position shown until it is time to effect the moulding, by the stop pieces 26. A mould member 5 is laid on the glass and forms the inner edge of the upper part of the rim. It also forms, with the member 2 an upward continuation of the channel 22, in which the rectangular plunger 27 is adapted to slide. The bottom surface of the plunger 27 is adapted to form the upper side of the rim. Plastic material is filled into the hollow 4 before the plunger 27 is put into its channel. The plunger 27 has slots 28 through which are adapted to pass lugs 29 of a plate 30. Bolts 32, through the lugs 29, fix the plate 30 on to the upper surface of the member 2. Springs 31 between the member 5 and the plate 30 serve to press the member 5 on to the glass sheet 1, when the plate 30 is bolted to the member 2. After the plate 30 has been bolted on, the stops 26 are removed and pressure is applied between the frame 25 (with the plunger 23) and the plunger 27 to mould the plastic material on to the edge 3 of the glass sheet.

The heating devices customary in moulds for plastic material have not been shown, since they form no part of the invention and their omission makes the drawings clearer.

In the case of the method illustrated in figure 1, it is advisable (and, in the case of thin glass, essential) that the horizontal space between the end of the glass sheet and the outer periphery of the hollow be wide enough to allow the plastic material to flow easily from the upper to the lower side of the overhanging edge of the sheet, because then the pressure exerted by the plunger in moulding is partly transmitted to the underside of the overhanging edge, and is not wholly exerted as a downward bending moment on the edge. By this method we have successfully moulded a rim of "Bakelite" on to the edge of a sheet of glass 3/16 inch thick, employing a moulding pressure of about 1 ton per square inch and a temperature of about 170 degrees Centigrade. The other, less

simple methods of moulding are useful in cases where a considerable length of overhanging edge is desired or where a very deep rim has to be moulded.

5 The process is applicable to glass articles such, for example, as dishes, provided that their form is such that they can be pressed between two parts of the mould which form the inner edges of the rim to be moulded, or pressed by one part 10 of the mould on to an independently moulded portion of the rim.

By "tempering" glass is meant subjecting it to a process of heating and rapid 15 cooling which increases its strength and its resistance to temperature differences.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to 20 be performed, we declare that what we claim is:—

1. Process of forming a composite article consisting of a glass sheet or 25 article with a rim of plastic material of the kind specified moulded about its edge, characterised by tempering the glass, placing it on a mould with its edge protruding into only a portion of a hollow thereof, filling the plastic material into 30 the hollow and pressing it therein.

2. Process of forming a composite article consisting of a glass sheet or article with a rim of plastic material of the kind specified moulded about its edge, 35 characterised by tempering the glass, placing it in a first part of the mould with its edge protruding into only a portion of a hollow thereof, pressing a second part of the mould on to the glass to press the glass

on to the first part of the mould, filling 40 the plastic material into the hollow of the mould formed by the first and second parts thereof and pressing the material therein.

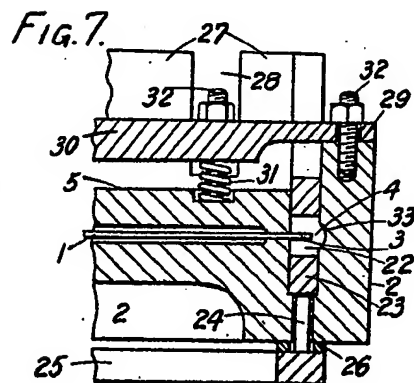
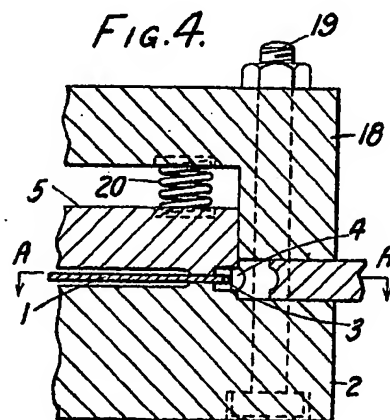
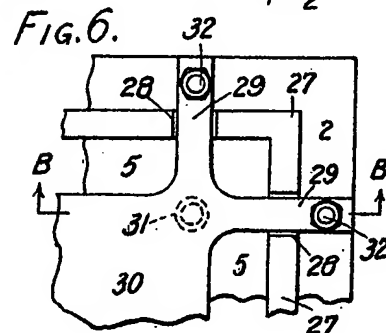
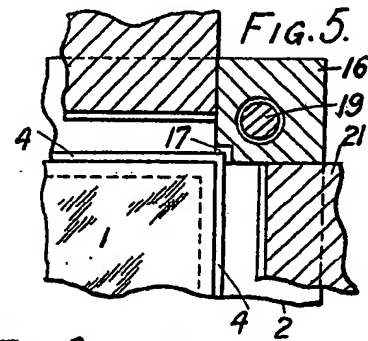
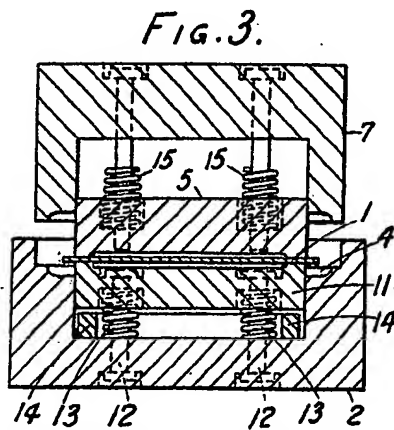
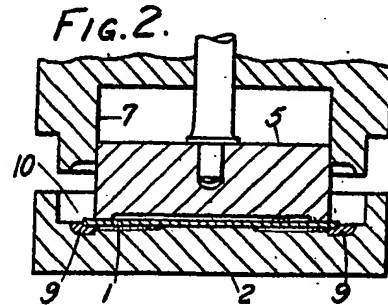
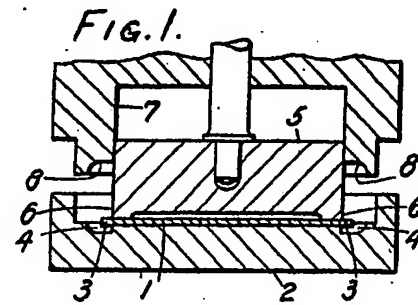
3. Process as in Claim 2, characterised by the plastic material being pressed to 45 mould it on to the glass by a plurality of plungers acting simultaneously to apply substantially equal pressure to the plastic material, above and below the glass.

4. Process of forming a composite 50 article consisting of a glass sheet or article with a rim of plastic material of the kind specified moulded about its edge, characterised by tempering the glass, moulding independently of the glass a por- 55 tion of the rim, placing the said portion of the rim on to a mould base, placing the tempered glass on to the said portion of the rim, placing a second part of the mould above the glass adapted to press it 60 on to the said portion of the rim, and adapted to form the inner edge of the rim above the glass, filling the plastic material into the space above the glass and the said portion of the rim and pressing the plastic 65 material to mould it on to the glass and the said portion of the rim by a third part of the mould.

5. As a new article of manufacture, a tempered glass sheet or article having a 70 rim of plastic material of the kind described moulded on to its edge by a process claimed in Claim 1, 2, 3 or 4.

Dated the 4th day of February, 1936.

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9, Kingsway, London, W.C.2.



[This Drawing is a reproduction of the Original on a reduced scale.]

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